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Convection-permitting modelling: a powerful tool for tropical convection

Abstract:

A decade of convection-permitting modelling has allowed significant advances in both operational weather forecasting and our understanding of tropical convection. Weather forecast skill in the tropics has traditionally been low because models have struggled to represent convective storms realistically. Increases in computer power have allowed models with finer and finer horizontal grid-spacing, which allows a better representation of detail such as coastlines and orography, and removes the need for a convection parameterisation scheme. The result is a more realistic representation of tropical convection, which has allowed in-depth study of the physical processes governing convective storms. A decade ago it was possible to run single case studies in convection-permitting models. Now it is possible to run continental-scale ensemble weather forecasts and multi-year climate simulations. In this talk I will present some examples of research that were facilitated by these modelling advances, including the initiation and development of convection, the drivers of climate extremes and the upscale impacts of convection. I will look ahead to the next generation of high resolution models and how they might help us advance our understanding of the Earth system.